REMARKS

Restriction Requirement:

This election is made provisionally with traverse for several reasons. First, this application is the national phase of an International Application, where during the international phase, this application was found to be in compliance with the Unity of Invention. Since during the national phase under 37 C.F.R. § 1.499, the Examiner is required to adhere to the same standard of Unity of Invention during the International phase under 37 C.F.R. § 1.475, the Examiner should abide by the findings of Unity of Invention made during the international phase.

Second, notwithstanding the above, the applicants assert that the application is presently in compliance with the Unity of Invention. The claims of Groups I and II are drawn to a category of a product and a process for using said product, which is in compliance with the unity of invention standard under 37 C.F.R. § 1.475(b)(2). Moreover, the claims of Groups I and II share a common novel technical feature and thus are in compliance with the Unity of Invention standard under 37 C.F.R. § 1.475(a). Applicants take exception to the mischaracterization of the invention of Group II, and assert that the invention of Group II is directed to a collector comprising a combination of an oil with a sulfur-containing sulfide mineral flotation promoter (Claim 25). This feature is indeed shared with the invention of Group I where this technical feature is recited in claim 8. Since this feature is not shown in Greenway (U.S. Patent No. 1,064,723) and is believed to be novel, it defines a contribution over the prior art. Therefore, the restriction requirement is requested to be withdrawn.

With regard to the species election, applicants first assert that the Examiner has no statutory or regulatory authority to impose a species election where the Examiner states that the species are part of the same generic invention. (Office Action at p. 2) Being part of the same generic invention implies that the multiple species do not lack Unity of Invention under PCT Rule 13.1.

Second, notwithstanding the above, applicants assert that the species form a singular inventive concept in compliance with PCT Rule 13.1. These species are all oils. Indeed, the natural oil and synthesized oil may include the same chemistry, the difference being how the oils are made. Therefore, since natural and synthesized oils include the same chemistry, these two species, at least, form a single general inventive concept and should be examined together. Likewise, natural oils and essential oils are both products of plants and thus share a common technical feature so as to form a single general inventive concept. Therefore, these two species should be examined together.

To the extent that the Examiner proposes that only two of the three species may be examined together on the basis of applicants' arguments above, the Examiner is kindly requested to contact the undersigned by telephone for an election.

Preliminary Amendment:

Claims 1 and 24 have been amended. New claims 32-35 are added. Applicants submit that these amended claims are patentable for at least the following reasons. The Examiner has stated that the claims do not share a common technical feature that is novel over Greenway (U.S. Patent No. 1,064,723). Applicants assert that the Examiner's statement is likely in view of the superficial similarities between the prior art

and the present application. The preliminary amendment has been made to better define the invention, which along with the following remarks may aide the examiner in understanding the differences between the claimed invention and Greenway.

With regard to Claim 1, the amendment highlights the different aspects of the modern froth flotation process disclosed by the applicant, such as air-injection and surface adhesion of the mineral sulfides to the air bubbles, as described on page 5 of the patent application; and the use of small quantities of collectors, shown in all the examples. New Claims 32-34 disclose preferred smaller dosages of collector used in the examples. Thus, less than 100 g of oil per ton or ore is used, preferably less than 50 g/ton, more preferably less than 30 g/ton, and most preferably less than 10 g/ton. At these levels of oil, a separate oil phase cannot exist that can be merely skimmed from the surface of the water.

In contrast, US 1,064,723 to Greenway et al. (US '723) discloses a froth flotation system operating on very different principles. The system in US '723 relied not on air-injection to create bubbles to which the mineral may adhere, but instead merely used an agitator to beat the air into the oil and water mixture and cause the minerals to become mechanically adhered to the oil. Then, in the settling zone F, referred to as the spitzkasten, the mineral-laden oil with trapped air and water phases would separate and the oil phase would be skimmed off the surface. The document US '723 discloses at col. 1, line 49, that relatively large amounts of essential oils, between 0.4 lbs (182 g) and 2.25 lbs (1,022 g) of oil per ton of ore must be used. The larger amounts of oils are necessary for the formation of a separate oil phase that may be skimmed off the top of

the settling zone. Therefore, the specific features now claimed by the applicants are not disclosed by this document.

The same arguments as to the differences between the modern floth flotation process claimed invention and the archaic flotation process disclosed in US '573 may be applied to other "old" prior art references describing oil phase separation processes requiring agitating or beating the oil phase into a froth for separation.

Moreover, the claimed invention is not obvious over US '723 because one skilled in the art would not understand from reviewing US '723 that such essential oils could be used in an air-injection froth flotation process at relatively lower concentrations and obtain the selective floatation of mineral sulfides. As shown in examples 5 and 6 of the present application, at concentrations of cottonseed oil of 123 g/ton, which is greater than now claimed, but less than disclosed in US '723, there is a little recovery of oxide minerals (calcite and silica), as shown in Tables 8 and 9. This evidences that at the higher amounts of oils used in US '723 there would be even greater recovery of oxide minerals and lower selectivity for sulfide minerals because of the known property for oils at higher concentrations to mechanically and non-selectively adhere to all mineral types.

Clearly, there is no suggestion in US '723 that smaller amounts of oil would be successful in an air-injection flotation where there is insufficient amount of oil to form a separate oil phase to be separated, and that the recovery would be selective. New claims 32-34 are directed to these lower amounts of oils. The present application teaches these lower amounts, which in order of decreasing concentration of oil, are described in that Example 8 uses oil as a collector in an amount of 100 g/ton of ore; Example 11 uses 50 g/ton; Examples 2, 9 and 10 use 30 g/ton; Example 7 uses 24

g/ton; and Examples 1, 3 and 4 use 10 g/ton or less. Nor is there any suggestion in US '723 of using repeated floatation steps as now claimed in claim 35. Examples 2, 3 and 4 of the present application teach successive floatation steps to enhance the recovery and purity of the recovered minerals due to the increased selectivity of the collector at smaller concentrations.

We believe that the same arguments stated above for Claim 1 also applies to Claim 24.

With regard to Claims 2-23, we also believe the claims are novel and not obvious, as we explain below. First, the same reasons applied to claim 1 being patentable over US '723 apply to these claims.

Second, with regard to specific dependent claims, Claims 8 -11 require the additional use of a sulfur-containing sulfide mineral flotation promoter. Claims 11 and 12 require the additional use of a frother. Claim 13 requires the additional use of a petroleum-based flotation promotor. The use of these additional ingredients is not disclosed in US '723. Moreover, the use of these additional ingredients enhance the performance of the collectors of claim 1, and would not be obvious to combine with US '723 in a floatation process as described there, since there is no description of any particular advantage that could be obtained in a mechanically agitated froth floatation system with large amounts of oil being used.

Claims 14-22 require the use of specially preferred oils that exhibit superior performance. Within this group of claims, Claims 16-18 and 21-22 exclude the use of any essential oil. Therefore, US '723, is not even applicable against these latter claims.

As for Claim 20, this claim is limited to the use of two surprisingly superior essential oils: limonene and citronella. Neither of these oils are even disclosed in US '723. While it may be obvious to experiment with every essential oil, there is no teaching to suggest that these two unidentified oils would be specially preferred at concentrations a magnitude of order below what is disclosed of all other essential oils generally in US '723.

In addition, applicants point out that the claims recite the use not of liquid oil fatty acid, such as disclosed in Unger et al., US 4,507,198, which is referred to as a "tall oil" but is in essence a fatty acid. Such a liquid oil fatty acid is excluded from the claims, which are limited to natural oils or synthetic oils that are triglycerides of fatty acids or esters of a fatty acid and an alcohol, or to essential oils. In contrast, liquid oil fatty acid is not a triglyceride, but is a fatty acid. As disclosed in the background section of the present application, fatty acids are not selective collectors and thus not effective for this invention and outside the scope of the claims.

Likewise, applicants point out that the claims require that the triglycerides contain fatty acids of only 20 carbons or less. Thus, natural oils, such as rapeseed oil, or certain canola oils, which contain triglycerides of erucic acid, are outside the scope of the claims because erucic acid is a fatty acid of 22 carbons. As applicants noted at page 8 of the present application:

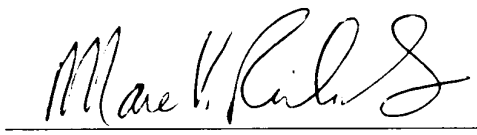
> It was unexpectedly found, however, that oils containing triglycerides that have fatty acids with 20 carbon atoms or less, perform much better than oils, such as canola oil, that contain triglycerides with fatty acids having 22 carbons or more, such as erucic acid ($C_{22:1}$). Moreover, since oils containing triglycerides of fatty acids with twenty carbon atoms or less do not contain free fatty acids, they do not behave as either fatty acids or soaps of fatty acids. The selective nature of these

oils in flotation was surprising because fatty acids and fatty acid salts (i.e., soaps) are very non-selective

Accordingly, applicants believe that the present pending claims, for both the elected and non-elected species and inventions, are patentable.

The Examiner is kindly requested to telephone the undersigned attorney should there be any matters of an informal nature that may be expeditiously resolved with a phone call.

Respectfully submitted,



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APPENDIX

1. (Once Amended) A method for beneficiation of a mineral sulfide-containing material by air-injection froth flotation in the presence of a collector, the method comprising the steps of:

a) providing an aqueous slurry of the mineral sulfide-containing material,

b) adding a selective collector to the slurry in an amount less than about 100g/ton of the mineral sulfide-containing material, the collector comprising at least one oil selected from the group consisting of:

1) a natural oil or synthesized oil comprising:

A) triglycerides containing fatty acids of only 20 carbons or less, or

B) an ester made from a fatty acid and an alcohol; and

2) an essential oil;

c) selectively floating the mineral sulfide by injecting air and selectively allowing the mineral sulfides to adhere to the air bubbles; and

d) recovering the mineral.

24. (Once Amended) A method for beneficiation of a metallic species of gold, silver, copper, palladium, platinum, iridium, osmium, rhodium, and ruthenium by air-injection froth flotation in the presence of a collector, the method comprising the steps of:

a) providing an aqueous slurry of a material containing the metallic species, the material being derived from any ore, concentrate, residue, slag, or waste,

b) adding a selective collector to the slurry in an amount less than about 100 g per ton of material containing metallic species, the collector comprising at least one oil selected from the group consisting of:

1) a natural oil or synthesized oil comprising:

A) triglycerides containing fatty acids of only 20 carbons or less, or

B) an ester made from a fatty acid and an alcohol; and

2) an essential oil;

c) selectively floating the metallic species by injecting air and selectively allowing the mineral sulfides to adhere to the air bubbles; and

d) recovering the metallic species.

32. (New) The method of claim 1 wherein the collector is added in an amount less than about 50 g/ton of material.

33. (New) The method of claim 1 wherein the collector is added in an amount less than about 30 g/ton of material.

34. (New) The method of claim 1 wherein the collector is added in an amount less than about 10 g/ton of material.

35. (New) The method of claim 1, further comprising separating the floated mineral sulfide and subjecting the mineral sulfide to a second floatation by repeating steps (b) and (c).